

Basal Insulin Requirements on CSII During the First 12 Months After Diagnosis of Type 1 Diabetes

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Abstract

While the endogenous first-phase insulin response has disappeared by the time of diagnosis of type 1 diabetes (T1DM), anecdotal evidence suggests that these patients can continue to have a second-phase insulin response during the first 12 months after diagnosis of T1DM. To this end, we hypothesized that patients who are started on insulin pump therapy (CSII) at the time of diagnosis of T1DM would have a lower basal insulin requirement than the 40-60% usually expected. We analyzed 38 patients with T1DM, age 9.9 ± 6.4 yrs (range 1.3-32.3 yrs), 79% M, who were started on CSII within the first month of diagnosis of T1DM. Basal insulin requirements were, on average, 47-49% of total daily dose (TDD) during the first 12 months after diagnosis (range 16-100%, p=NS), and decreased from 0.30 u/kg/day at time of dx to 0.20 u/kg/day by 12 mos (p=0.05). Baseline % basal insulin was significantly correlated with baseline HbA1c ($r=-0.513$, $p=0.01$) and HbA1c 6 months after dx ($r=-0.501$, $p=0.03$). The % basal insulin requirement at 12 months after diagnosis was significantly correlated with baseline BMI ($r=0.636$, $p<0.05$) and current BMI ($r=0.651$, $p=0.04$). No other correlations between % basal insulin requirements were seen when compared to age at dx, HbA1c, weight, BMI, or total exogenous insulin requirements. Our data suggest that even though some endogenous insulin production remains during the first year after dx of T1DM, the distribution of basal vs total daily insulin requirements remains the same as in the general population of people with diabetes. There may be benefits to starting patients on a higher basal rate at time of dx for overall glycemic control during the first 6 months. Further research needs to be done to see if these results hold true for all practice settings.

Objectives

To determine basal insulin requirements during the first 12 months after diagnosis of type 1 diabetes in patients who are started on insulin pump therapy within the first month after diagnosis.

Hypothesis

Basal insulin requirements will be lower in patients newly diagnosed with type 1 diabetes compared to the standard 40-60% basal insulin requirement in patients with established diabetes due to pathophysiological insulin secretion during beta cell destruction.

Methods

- Subjects/families approached during initial visit/hospitalization when diagnosed with type 1 diabetes. Consent obtained where necessary.
- The rationale of starting pump therapy as soon as possible explained to the families by the physician.
- Subjects started on CSII (loaner pump) within 1st month of dx of T1DM. CSII taught by Diabetes NP; CHO counting taught by Nutritionist and reviewed by Diabetes Team.
- Inpatients (n=12) started straight on insulin; outpatients (n=26) started on saline and returned within 1 week for switchover to Humalog insulin.
- Initially intensive follow-up, involving NP and Fellow On Call/MD on-call coverage during first 24 hours and daily phone calls from pt to NP for first 2 days, then spaced to every few days to weekly to prn with increased patient/family comfort and documented stability of BG's.
- Patient switched over from loaner pump to their own pump upon receipt of own pump and returned loaner pump to Diabetes Team.
- Clinical follow-up: 1 month after initiation of CSII, then every 3 months thereafter or more often as needed.
- Research follow-up: 3 hour MMTT done at 0, 6, and 12 months after diagnosis (n=28).
- Statistical analysis of data done using mean and standard deviation calculations, unpaired 2-tailed t-tests, and correlations (Pearson correlation coefficients) using SPSS.

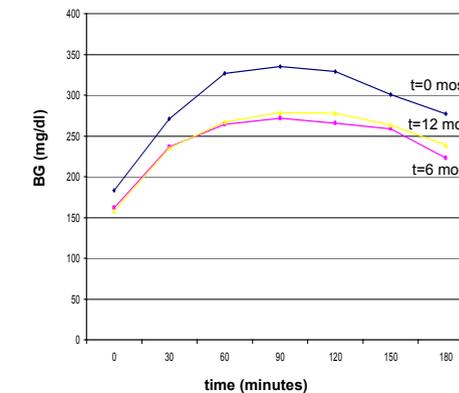
Results

Demographics	N	38
Age at diagnosis		9.9 ± 6.4 yrs (1.3-32.3 yrs)
M/F		79% (n=30) / 21% (n=8)

	0 months	6 months	12 months
HbA1c (%)	10.9 ± 2.3	6.6 ± 1.2	7.4 ± 1.8
Total u/kg/day	0.55 ± 0.25	0.46 ± 0.22	0.50 ± 0.19
Basal u/kg/day	0.30 ± 0.16	0.24 ± 0.13	0.20 ± 0.11
Basal as % of TDD	$48 \pm 6\%$	$49 \pm 20\%$	$47 \pm 23\%$
BMI (kg/m ²)	20.0 ± 6.4	19.6 ± 4.7	22.0 ± 7.1

Results

Average BG over time during 3 hour MMTT



Correlations (Pearson correlation coefficient)

	% basal 0	% basal 12
HbA1c 0	$r = -0.513$ $p = 0.01$	NS
HbA1c 6	$r = -0.501$ $p = 0.03$	NS
BMI 0	NS	$r = 0.636$ $p < 0.05$
BMI 12	NS	$r = 0.651$ $p = 0.04$

All other correlations vs % basal insulin requirement p=NS.

Conclusions

1. In patients with newly diagnosed type 1 diabetes, the distribution of basal vs total daily insulin requirements is similar to the general population of people with diabetes.
2. An observed decrease in blood sugar after the 90-minute time point of a MMTT does not support the hypothesis that patients with newly diagnosed type 1 diabetes require less basal insulin because of endogenous basal insulin production.
3. A lower HbA1c was correlated with a higher % of basal insulin through 6 months after dx. There may be benefits to starting patients on a higher basal rate at time of dx for overall glycemic control during the first 6 months.
4. A higher BMI at both baseline and 12 months was correlated with higher basal insulin requirements 12 months after diagnosis.

References

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